Appendix M – Reasonably Foreseeable Development Scenario

TABLE OF CONTENTS

M.1 Introduction

As part of the Bakersfield FO RMP process, reasonably foreseeable development (RFD) scenarios for minerals and renewable energy were developed to aid in assessing the potential consequences of the alternatives. An RFD is a forecast or estimate of activity that is likely to occur. The goal is to give scope or scale to the potential consequences of new activities and their associated impacts on the environment. The RFD is not meant to predict actual activities but to be a basis for quantifying environmental effects from a range of development scenarios.

The RFD projection is based on knowledge of past use, the capability of the resource for additional development, local and regional economic trends, and the needs of the public. The data presented in an RFD is deliberately general for ease in assessment. Specific locations of surface-disturbing activities, such as road or oil well developments, are not indicated. The period covered by this RFD is ten to fifteen years.

Regulations in the 1987 Onshore Oil and Gas Leasing Reform Act require such a projection to be formulated to facilitate development of federal lands that are not otherwise constrained by existing land allocations, such as wilderness areas and mineral withdrawals.

Typical resources that would be evaluated with an RFD format are oil and gas, hard rock mining, livestock grazing, improvements (such as rights-of-way), and recreation. The information presented here for oil and gas, hard rock mining, geothermal leasing, and renewable energy development is a summary of potential projected activity.

Minerals management programs with the Bakersfield FO primarily involve oil and gas leasing, solid leasable minerals (phosphates, salines), locatable minerals (metals, gypsum), and salable minerals (sand, gravel, clay, and decorative rock). The federal mineral estate addressed by the Bakersfield RMP totals 1,162,210 acres for fluid minerals, 1,046,530 acres for solid leasable minerals, and 1,046,290 acres for locatable and salable minerals.

M.2 Mineral Leasing

Federal leasable minerals are classified as fluid minerals or solid leasable minerals. Either kind of mineral can be developed after obtaining a lease from the BLM. Leasable fluid minerals include oil, gas, geothermal resources, and carbon dioxide. Leasable solid minerals include coal, potash, sulfur, and sodium. Just less than 150,850 acres or 13 percent of the federal mineral estate within the Bakersfield FO is closed to oil and gas leasing and 228,840 acres or 22 percent are closed to solid leasable mineral leases.

M.2.1 Fluid Minerals

Oil and Gas Resources

The RFD for oil and gas is a projection of the exploration, drilling, and production activity that is likely to occur in the next 10 to 15 years.

Between 100 and 400 federal wells are forecast to be drilled on federal mineral estate per year. Although the average was 191 wells per year during the last decade, 363 drilling permits were issued in

FY 2010. The higher stabilized prices may result in increased drilling in areas that were previously marginal, such as deep fractured shale and shallow diatomite zones. New surface disturbance associated with exploration and development is estimated to involve between 100 and 265 acres per year. This includes roads, pads, facilities, pipelines, power lines, and all other associated activities except for running seismic lines, and includes both short-term and long-term impacts. Approximately 25 to 35 percent of the surface disturbance would be short term and would be reclaimed within two to three years.

A recent analysis of seismic projects approved over the past decade showed that there were approximately 1.5-4 acres of disturbance per square mile of seismic lines run, and virtually all of that would be transient or temporary. For the maximum expected 1000 square miles of 3-D seismic over the life of this plan, that would result in approximately 4000 acres of disturbance. Additional actions resulting in temporary effects include the drilling of unsuccessful wells. Long-term disturbance may not be reclaimed in two to three years and perhaps not during the plan life. Successful drilling and the related production facilities, roads, and some seismic exploration create long-term effects. The positive impact of separating the two categories of surface-disturbance is that the brief surface effects of drilling an unsuccessful well and the minimal effects from most geophysical activity can be quantified, while long-term effects, such as a producing oil field and its processing facilities, can be realistically examined. Up to 100 acres of inactive wells, roads, pads, and other disturbed areas would be reclaimed annually. In addition, current best management practices are resulting in land being reclaimed in the interim before the leases and fields are abandoned.

The past 10 to 15 years have seen both historic lows and historic highs in both oil prices and drilling. Between late 1998 and mid-2008, oil prices for the Midway Sunset field, which produces the largest volume of federal crude in California, rose from $6 per barrel to $120 per barrel, a 20-fold increase. However, U.S. and world economic conditions have significantly deteriorated since then, and Midway Sunset crude was down to approximately $25 per barrel in late 2009. As of February 2010, the price had risen back to $69 per barrel, by mid-January 2011, to $86.25, and by mid-March 2011, to nearly $110 per barrel, further demonstrating the volatility of crude prices. Consequently, there is no consensus among forecasters as to what the demand for oil will be in either the near term or long term. Most current forecasts are for demand to continue to drop in the near term to midterm and to remain depressed into the foreseeable future.

Between approximately 80 and 90 percent of all surface-disturbing activities related to the oil industry would occur in the San Joaquin Valley portion of the Planning Area. In fact, during the last 10+ years, more than 95% of all federal drilling has occurred in this area. Most of this would be within the established boundaries of producing fields in Kern County, and the vast majority would be on lands that are already leased (not on new leases issued subsequent to this RMP). Surface disturbance from drilling new wells accounts for about 65 percent of the long-term surface disturbance. Associated activities such as new processing facilities, roads, pipelines, and seismic surveys account for the rest of the disturbance.

No significant new fields have been discovered in the Bakersfield FO decision area in the last twenty years. The discoveries were all in the San Joaquin Valley portion of the Planning Area, and none contained lands with any federal interest. There is virtually no correlation between oil prices and federal wells drilled; in fact, the record high for wells drilled in a year (428) occurred in 1998, the same year that recorded the lowest average oil price, $8.46 per barrel. The reason is most likely because development of federal leases is so heavily concentrated in a very few areas that are somewhat insulated from short-term swings in prices. Consequently, current activity levels are not expected to be significantly different

from what has occurred in the past. Additions of new reserves are expected to continue the decline begun in 1990 in all management areas. Other factors unique to California sometimes further depress oil prices and discourage new drilling, such as a severe shortage of rigs during the early 2000s.

The geologic basins of the Coast Range and coastal areas are mature oil-producing basins (the onshore portions of the Santa Maria and Ventura basins), meaning that most of the obvious and the more obscure structural oil prospects have been drilled. Further depressing drilling on the coast is the relatively high cost of exploration, compared to other parts of the state. Higher drilling and completion costs are the result of surface restrictions, rough terrain, and well depths. Although industry interest in leasing newly available lands is likely, new exploration projects that result in actual drilling are likely to continue to be rare.

Similarly, the oilfields in the San Joaquin Valley are among the oldest in the world, several of them having been discovered well over 100 years ago; consequently, most of the activity continues to be within existing fields.

Although projections were made on a field-by-field basis, the numbers contained in the RFD are meant to be used as averages during the life of the plan. Some fields may have fewer or more wells drilled than projected, and some years may see very high or very low numbers for overall activity. Because oil and gas are worldwide commodities, events that occur globally may have significant effects on US production. The political instability of other nations that have most of the world's reserves changes regularly, causing difficulty in forecasting worldwide levels of petroleum supply and demand. In addition, the US and worldwide economic conditions have changed dramatically within the last couple of years, causing further uncertainty.

Two other sources of data may be of interest to the reader, although they are not specific to federal land. The U. S. Geological survey produced an oil and gas development forecast in 2007 titled "Petroleum Systems and Geologic Assessment of Oil and Gas in the San Joaquin Basin Province, California." This report was published as U.S. Geological Survey Professional Paper 1713. Another document is the National Oil and Gas Assessment Inventory, accessible at: http://energy.cr.usgs.gov/oilgas/noga/.

Additional details (number and status of wells, production) on a county by county basis for the entire state are found in the figure below that includes all of the wells in the state, both federal and private.

PRODUCING WELLS AND PRODUCTION OF OIL, GAS, AND WATER BY COUNTY - 2008*

COUNTY NAME	NUMBER OF WELLS				OIL PRODUCTION (bbl)	NET GAS PRODUCTION (Mcf)			WATER PRODUCTION (bbl)
	OIL		GAS			ASSOCIATED (from oil zones)	NONASSOCIATED (from gas zones)	TOTAL	
	PROD	SHTN	PROD	SHTN					
Alameda	6	1	0	0	18,454	0	0	0	43,412
Butte	0	0	8	3	0	0	59,848	59,848	112
Colusa	0	0	248	85	0	0	10,887,536	10,887,536	142,001
Contra Costa	0	0	24	19	a/ 0	0	1,578,456	1,578,456	51,292
Fresno	2,008	1,347	4	1	b/ 6,269,839	819,930	108,474	928,404	84,461,341
Glenn	0	0	234	57	0	0	9,502,588	9,502,588	94,462
Humboldt	0	3	36	16	0	0	1,023,678	1,023,678	10,688
Kern	42,065	13,808	194	110	c/ 162,206,386	149,662,564	4,794,400	154,456,964	1,448,411,573
Kings	168	159	0	2	111,793	60,981	0	60,981	178,167
Lassen	0	0	0	6	0	0	0	0	0
Los Angeles	3,427	1,419	11	19	d/ 25,874,776	11,745,183	300,984	12,046,167	750,099,319
Madera	0	0	17	19	0	0	2,552,570	2,552,570	5,571
Merced	0	0	2	1	0	0	71,318	71,318	336
Monterey	487	678	0	0	4,315,085	723,501	0	723,501	104,377,904
Orange	1,078	571	0	0	4,704,930	2,200,510	0	2,200,510	70,376,290
Riverside	0	3	0	1	0	0	0	0	0
Sacramento	0	0	151	67	e/ 0	0	16,921,988	16,921,988	515,020
San Benito	23	15	2	5	7,142	2,033	26,526	28,559	258,958
San Bernardino	8	30	0	0	2,904	60	0	60	934
San Joaquin	0	0	71	86	0	0	6,780,756	6,780,756	291,998
San Luis Obispo	156	162	0	0	525,047	158,168	0	158,168	7,499,609
San Mateo	13	12	0	0	3,704	0	0	0	13,404
Santa Barbara	861	1,256	1	3	f/ 3,009,057	2,581,586	3,153	2,584,739	70,587,676
Santa Clara	11	2	0	0	28,214	5,775	0	5,775	13,587
Solano	0	0	172	107	g/ 0	0	14,614,956	14,614,956	328,858
Stanislaus	0	0	2	0	0	0	354,050	354,050	0
Sutter	0	0	274	98	h/ 0	0	13,683,634	13,683,634	137,659
Tehama	0	0	136	29	0	0	3,394,685	3,394,685	111,574
Tulare	72	9	0	13	51,502	56	0	56	3,440,079
Ventura	1,761	1,293	0	6	7,466,152	7,626,361	0	7,626,361	50,784,784
Yolo	0	0	50	42	i/ 0	0	3,196,124	3,196,124	187,923
Yuba	0	0	1	0			2,449	2,449	0
STATE TOTALS	52,144	20,768	1,638	795	214,594,985	175,586,708	89,858,173	265,444,881	2,592,424,531

Figure M-1. Producing Wells and Production of Oil, Gas, and Water by County - 2008

Coast

Although there are many oil and gas fields with billions of barrels of oil and trillions of cubic feet of gas production and reserves, there is very little federal mineral estate in the area. Only the Sespe oilfield within the boundaries of Los Padres National Forest contains any significant amount of federal mineral estate, and nearly that entire oilfield is covered under the 2005 Los Padres Oil RMP/EIS. Consequently, very little activity has occurred or is expected to occur on BLM-administered lands within this area.

San Joaquin Valley

Between 2003 and 2007, nearly 90 percent of the wells drilled in California were drilled on lands within the RMP planning area. On federal lands, virtually 100 percent of all federal wells drilled within the past 14 years were drilled in the San Joaquin Valley. Within the RMP decision area, most of the oil and gas activities are projected to occur within the San Joaquin Valley. Most federal drilling occurs on a relatively few leases, most of which are operated by a handful of operators.

Sierra Nevada Range

The Sierra Nevada Range portion of the Planning Area has little or no potential for the accumulation of hydrocarbons.

Ongoing reviews of the monthly activity in the Bakersfield FO suggest that the activity levels within existing fields may stabilize at current levels. More specifically, federal oil activity would continue to be focused in the Midway-Sunset and Lost Hills Fields in the San Joaquin Valley.

Geothermal Resources

In December 2008, the BLM issued a Record of Decision (ROD) for the Programmatic Environmental Impact Statement (PEIS) for Geothermal Leasing in the Western United States. This ROD documented the BLM's decision to facilitate geothermal leasing of the federal mineral estate in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. This decision allocated BLM lands as open to be considered for geothermal leasing or closed to geothermal leasing. The ROD adopted stipulations, best management practices, and procedures for geothermal leasing and development and stated that these actions would be implemented through BLM resource management plans.

Although most of the lands within the decision area are open to geothermal leasing and development, all Areas of Critical Environmental Concern (ACECs) were closed to geothermal leasing in the ROD for the nationwide EIS.

Within the Planning Area Kernville Hot Springs near Lake Isabella has high potential for the development of geothermal resources. This area of high potential extends south and west to Democrat Hot Springs, within the boundary of lands managed by the US Forest Service. Within the Sierra Nevada, a broad area of moderate potential surrounds Lake Isabella, extending from California Hot Springs on the northwest to Walker Pass on the southeast. Furthermore, an area extending from Springville on the west nearly to Coso Hot Springs on the east also has moderate potential. In the Transverse Range, an area with several hot springs, extending west from Sespe Hot Springs for over thirty miles, has moderate potential.

Within the RMP decision area, there are currently no federal geothermal leases. There has historically been little interest in geothermal development in the decision area. Therefore, based on the RFD in the PEIS it is projected that no direct use or indirect use geothermal development will occur on public lands within the Planning Area over the next 10 years.

M.2.2 Solid Leasable Minerals

The solid leasable mineral resources in the Bakersfield FO planning area mostly consist of phosphate and saline (salt) materials. Within the decision area, about 35,084 acres of federal mineral estate is classified as prospectively valuable for these minerals and, therefore, have .potential for solid leasable mineral development. Of these, 493 acres of the potential area is currently closed to development.

Saline and Phosphate Minerals

The BLM has classified several areas as prospectively valuable for phosphates within the Transverse Ranges and the southern Coast Ranges. A few of these areas have small tracts of BLM-managed public lands within them, although two areas have significant acreages of BLM-managed public land: San Luis Obispo County, from just east of Creston to just south of State Highway 58 at San Juan Creek, west of US Highway 101 from Atascadero north to Adelaida, and at the southern end of Morales Canyon northwest of New Cuyama; Kern County, on the east side of the Temblor Range from just south of McKittrick Summit north to State Highway 46. Over the past 20 years, there have been about a dozen phosphate

prospecting permits or leases within the Bakersfield FO, most of which have been on lands administered by the US Forest Service. All of these permits are either dormant or expired.

Saline minerals have been produced from Soda Lake in the Carrizo Plain, Lockwood Valley near Mount Pinos, and Proctor Dry Lake near Tehachapi. Soda Lake, which is outside of the decision area for this RMP, was mined from the 1880s until about the 1920s for salt and sodium sulfate. Borate minerals were mined within the boundary of Los Padres National Forest in the Lockwood Valley early in the 1900s, and salt was produced from Proctor Lake. The BLM has classified all three areas as prospectively valuable for sodium and potassium.

In the past, phosphate and saline developments have impacted between 20 and 40 acres. Any future development of these resources would likely impact between 10 and 80 acres per project. Only one such project is considered likely to occur in the next 20 years.

Other Solid Leasable Minerals

On average, the Bakersfield FO receives one proposal for mining solid leasable minerals (other than saline or phosphates) every couple of years. Each of these proposals would typically impact up to 20 acres. Over the next 20 years, there may be as many as five mining plans for solid leasable minerals. The total projected surface disturbances from these projects after reclamation would be 130 acres.

M.3 Locatable Minerals

Locatable minerals are those for which the right to explore, develop, and extract mineral resources on federal lands open to mineral entry is established by the location (or staking) of lode or placer mining claims as authorized under the General Mining Law of 1872. Mining is also regulated under 40 CFR 3802, Exploration and Mining, Wilderness Review Program, 40 CFR 3809, Surface Management, and 43 CFR 6304, Uses Addressed in Special Provisions of the Wilderness Act, and other applicable federal regulations. Locatable minerals are part of the federal mineral estate on split-estate lands, with private surface patented under the Stock Raising Homestead Act. In these ranching patents, the surface became private, but the Federal Government retained the minerals. Mining claims can be staked on SRH Lands. Regulations for staking mining claims on private lands are contained in 43 CFR, 3838.

Because of the variety of potentially locatable minerals, there is not a definitive list of locatable minerals. The 1872 Mining Law itself mentions only those metallic minerals known to be valuable at the time. As a result of various court decisions and new laws over the years, other minerals, including some nonmetallic minerals, have been added (such as materials use in the production of kitty litter, or pumice that breaks naturally into dimensions of 3 inches or greater). Some minerals are considered locatable only if they are “unique” and have a “distinct and special value.” The BLM has to make such a determination on a case-by-case basis. In general, metallic minerals are locatable.

Historically, locatable minerals mined within the Bakersfield FO are gold, silver, copper, lead, zinc, tungsten, mercury, chromite, manganese, antimony, and uranium. Nonmetallic minerals mined are diatomaceous shale, diatomite, limestone, pumice, fuller’s earth, barite, magnesite, and feldspar. Limited noncommercial amounts of gemstones (including rare varieties of agate) and gem minerals may be collected for free. Commercial collection is normally done under a mining claim. Uncommon varieties of agate and gemstones do occur within the Bakersfield FO.

There are 257,690 acres in the Bakersfield Decision Area with potential for locatable mineral development; however, there are approximately 21,000 acres with potential that are currently withdrawn from entry under the mining law.

Areas of Disturbance for Locatable Minerals

Because the area needed for each mine depends on the mineral deposit and the economics and regulations affecting the mining methods, there are no typical amounts of disturbance support facilities that can be readily predicted. However, historically, most exploration programs for locatable minerals have caused less than five acres of surface disturbance, while most development projects have caused 10 to 80 acres of disturbance. If fewer than five acres of surface disturbance are proposed, a notice must be submitted to the BLM before disturbing the surface. If more than five acres of surface disturbance are proposed or if the proposed operation is within an ACEC, federal regulations require that a plan of operations and a reclamation plan be submitted and that an environmental assessment or EIS be prepared.

Typically, the Bakersfield FO receives up to three mining notices each year, averaging two acres. It receives up to one plan of operations each year that would impact an average of 10 acres. Over the next 20 years, there may be as many as 60 mining notices and 10 plans of operation. Total projected surface disturbances, after reclamation would be 230 acres.

M.4 Salable Minerals

The BLM defines common varieties of sand, gravel, stone, pumice, pumicite, cinders, and ordinary clay as salable, not locatable (BLM 2004a). Salable minerals include materials used for building and construction, both commercially and privately. Sand, gravel, aggregate, lime (limestone), cinders, and building stone are the more common salable minerals. Use of salable minerals from public lands requires either a sales contract or a free use permit from the Bakersfield FO. The contract or permit may have stipulations on multiple land use. Disposals of salable minerals from public lands are regulated by 43 CFR, Part 3600.

Geology determines the location and character of the sand and gravel deposits from which aggregate is obtained. The most easily accessible sources of high quality aggregate are in and along modern river channels, floodplains, mill sites, and tunnel sites. Other suitable resources may be obtained from terrace deposits along modern river channels or from older channel or floodplain deposits that are buried beneath the present land surface. Extensive deposits of Pleistocene sand deposits east of Lake Isabella and in the San Joaquin Valley have good potential for use as fill. Recent alluvium within active riverbeds is mined for sand and gravel in many places on private lands.

There is an increasing demand for crushed stone produced from the mining, crushing, and sizing of granitic and volcanic rocks. Crushed stone is now being produced from several companies in the Sierra Nevada and Coast Range. They make up a widespread resource for mineral material development on BLM lands throughout the Bakersfield FO.

Salable minerals are expected to continue being mined within the Bakersfield FO. The demand for salable mineral resources is a function of market preferences and construction activity and depends on where the construction is taking place. Transportation costs for sand and gravel aggregate can be minimized by using a salable mineral source close to a construction site. It is likely that construction project managers will prefer using mineralized areas close to public roads.

Typically, the Bakersfield FO receives 10 to 20 requests for mineral materials from the Kelso Community pit each year. County governments and mineral material contractors are asking the BLM to establish new community pits on the west side of Kern County, in western Fresno County, and near the town of Coarsegold in Madera County. The Bakersfield FO will likely receive up to 15 permits for material sales from the Kelso pit each year for the next 20 years. This will cause no additional surface disturbance than what has already been authorized for this pit. Over the next 20 years, three new community pits are projected to be established, and there will likely be 10 new negotiated sales. Each of these projects would disturb up to 20 acres each, for a total projected disturbance of 200 acres

In the decision area, there are 51,275 acres of land with potential for salable mineral development. Of these, 7,594 acres or 15% of the potential area is closed to development.

M.5 Renewable Energy

Renewable energy includes solar power, wind, and biomass resources. As demand has increased for clean and viable energy to power the nation, consideration of renewable energy sources available on public lands has come to the forefront of land management planning.

In cooperation with the National Renewable Energy Laboratory, the BLM assessed renewable energy resources on public lands in the western United States (BLM and DOE 2003). The BLM reviewed the potential for concentrated solar power (CSP), photovoltaics (PV), wind, biomass, and geothermal energy on US Department of the Interior, Bureau of Indian Affairs, and Forest Service lands in the West. (Hydropower was not addressed.) While geothermal is a renewable energy source, it is considered a fluid leasable mineral and, therefore, is covered under Section M.2.1 above.

M.5.1 Solar

Resource Potential

The planning area did not rank among the top 25 BLM planning areas in the US having the highest CSP or PV potential. An area was considered to have high potential if it met the following criteria (BLM and DOE 2003):

- A minimum direct solar resource of six kilowatt-hours or greater per square meter per day ($kWh/m^2/day$);
- Terrain slope of less than or equal to five percent for CSP or one percent for PV;
- Within 50 miles of transmission 115-345 kV;
- Within 50 miles of major road or railroad;
- Minimum parcel size of 40 contiguous acres;
- Department of the Interior Bureau of Indian Affairs, BLM, or USDA Forest Service lands; and
- BLM and USDA Forest Service compatible land use.

Approximately 40 percent of the planning area met the solar resource criterion of six $kWh/m^2/day$. The terrain criterion was met throughout most of the San Joaquin Valley, sporadically within the Coast, and rarely within the Sierra Nevada Range. The entire planning area met the criteria for proximity to roads, railroads, and transmission lines. The majority of public lands within the Bakersfield FO are at least 40 contiguous acres in size (BLM and DOE 2003).

Public lands meeting the CSP and PV potential criteria have been identified within the San Joaquin Valley in the area to the northeast of the Carrizo Plain National Monument and near the town of South Lake near Lake Isabella in the southern portion of the Sierra Nevada Range near Highway 178 (BLM and DOE 2003). The lands near Lake Isabella have slopes of around five percent and would therefore be suitable only for CSP development.

While renewable energy potential has been identified in other portions of the Bakersfield FO with lands with high solar potential (Western Governor's Association and Department of Energy 2009), the rugged landscape and steep slopes preclude the development of solar energy with existing technologies. No other solar resources were identified within the Bakersfield FO.

Existing Activity

The Bakersfield FO does not currently have any solar installation projects on public land.

There is one pending solar right-of-way (ROW) application, CACA 51812, involving 1509 acres within the Atwell Island management area.

Two solar ROW applications were received in 2011: CACA 52471 involving an isolated 160 acre parcel of BLM managed lands near Duck Pond and CACA 52473 involving an isolated 80 acre parcel near Lost Hills. These applications were rejected in September and the cases closed in October 2011.

Reasonably Foreseeable Development Scenario

While most BLM parcels available for development are not large enough for commercial scale development on their own, there is the potential for projects occurring on adjacent private parcels to be partially located on BLM lands. The Bakersfield FO is expected to contain up to two CSP projects and up to five PV projects over the long term, given existing land allocations. The most likely sites for utility scale CSP or PV projects to be solely located on public land are just south of Lake Isabella and within the Atwell Island management area. Other solar projects may occur on smaller parcels if they are part of projects occurring on adjacent lands not administered by the BLM.

M.5.2 Wind

Resource Potential

Wind power classes range from 1 (lowest) to 7 (highest). Public lands in portions of the planning area are Class 3 and higher, although the planning area is not in the top 25 BLM planning units in the US having the highest wind energy potential (Class 5 and higher) (BLM and DOE 2003).

The PEIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2004b) categorizes public lands as having a low, medium, or high potential for wind energy development from 2005 through 2025, on the basis of their wind power classification. Wind resources in Class 3 and higher could be developed economically with current technology over the next 20 years. Class 3 resources have medium potential; resources in Classes 4 and higher have high potential. The PEIS identifies public land parcels with medium or high wind resource potential that might be developed economically with current technology. These areas are concentrated along ridgetops in the following areas:

- Tehachapi Mountains and Lake Isabella
- North of Fillmore and Piru
- Around Orchard Peak, east of Cholame, between State Routes 41 and 46.

The January 2009 Draft Map of the Western Renewable Energy Zones, a joint initiative of the Western Governors' Association and the US Department of Energy, identified the following areas as having wind potential (Western Governor's Association and Department of Energy 2009):

- The Tehachapi Mountain Range, extending from Frazier Park in the south to just south of Piute Peak in the north, with wind power classes ranging from 3 through 7;
- An area centered on Simi Valley, extending north to Fillmore, south to Thousand Oaks, west to Santa Paula, and east to San Fernando, with wind power classes ranging from 3 through 6;
- Scattered parcels across the mountain range bounded by Lompoc to the northwest, Solvang to the northeast, and the Pacific Ocean to the south, with wind power classes ranging from 3 through 7; and
- Scattered parcels in the coastal range from Nipomo in the south to Cambria in the north, with wind classes ranging from 3 through 6.

Existing Activity

There are currently no wind projects administered by the Field Office within the planning area.

In the past several years several ROW applications have been received for the following areas: east of Cholame, within the Temblor Range, near Lake Isabella, and within the Tehachapi Mountains. Most of these were dropped by the applicants.

In 2010 and 2011, four ROW applications for wind development were received and evaluated by the Field Office. CACA 49112, involving 8592 acres in the Tehachapi Mountains, was withdrawn by the applicant in January 2011. Three other applications (CACA 52611, 52612, and 52613) were rejected and the cases closed in June 2011.

Reasonably Foreseeable Development Scenario

Wind energy is expected to be developed within the Temblor Range, in the mountains near Fillmore in Ventura County, southwest of Lake Isabella, and within the Tehachapi Mountains over the long term. Other wind projects could occur in the future along the scattered parcels of public land that coincide with mountain peaks and ridges

M.5.3 Biomass

Resource Potential

Biomass resources include the use of biological materials such as sawdust or yard clippings directly as fuel, and the conversion of biological materials into usable fuel such as alcohol. The BLM/National Renewable Energy Laboratory study evaluated the long-term sustainability to support biomass plants using the monthly Normalized Difference Vegetation Index (NDVI) computed from the National Aeronautics and Space Administration's (NASA) Advanced Very High Resolution Radiometer Land

Pathfinder satellite program. The Bakersfield FO is not in the top 25 BLM planning areas having the highest potential for biomass resources. For an area to have biomass development potential, it would have had to meet the following criteria (BLM and DOE 2003):

- An NDVI of 0.4 for at least four months between April and September;
- A slope of less than 12 percent;
- No more than 50 miles from a town with at least 100 people; and
- BLM- and USFS-compatible land use.

Nearly all of the public lands within the Bakersfield FO are identified as meeting the criteria for having biomass potential.

Scattered parcels of high biomass potential lands occur throughout the Planning Area. The areas of highest concentration are at the following locations:

- Immediately south of State Route 58 approximately five miles east of Highway 101 and approximately 12 miles from the city of San Luis Obispo;
- Approximately 2.5 miles north of State Route 46 and 15 miles west of Highway 101;
- In Kern County, approximately three miles east of State Route 33 and four miles south of the Maricopa Highway (State Routes 33/166);
- In Santa Barbara County, half a mile west of State Route 33 (Maricopa Highway) around the unincorporated town of Ventucopa in the Cuyama Valley;
- Several remote areas throughout the Tehachapi Mountains, ranging from 10 to 12 miles north and northeast of State Route 58; and
- Multiple areas around all sides of Lake Isabella close to State Routes 178 and 155, Wofford Boulevard/Burlando Road, and Sierra Way.

Existing Activity

There are no current or historical biomass energy facilities on any public lands within the Bakersfield FO, nor has the Bakersfield FO received any applications for such facilities.

Reasonably Foreseeable Development Scenario

There is potential for biomass energy development in planning area over the long term. Unlike wind and solar resources, the location of a biomass facility does not correlate with the amount of production of biomass that local lands provide. Feedstock, which is the raw material used to fuel biomass, such as woody debris from forests and agricultural wastes from farm lands, needs to be transported to a biomass facility, so having such sources present at the regional level is sufficient. Both the Coastal and Sierra areas have high biomass yielding lands due to the forests in these areas, and the San Joaquin Valley contains vast amounts of high biomass-yielding lands due to the intensity of agricultural production. It is desirable to shorten the distance that a feedstock must be transported to a biomass facility; nevertheless, the entire planning area has so much biomass feedstock on public lands that the question of where to locate a biomass plant in the Bakersfield FO hinges more on the site's suitability for the construction of a facility than on the productivity of the site. Given this, it is likely that biomass

facilities would be located on private lands and that public lands would be used only as a source for biomass fuel.

M.6 References

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